RESMED

S9 VPAP™ Tx

POSITIVE AIRWAY PRESSURE THERAPY DEVICE

Clinical Guide

English


S9™ Series
More. Comfort.

ResMed

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Contents

General warnings and cautions

⚠ WARNINGS

- Read the entire manual before using the device.
- Use the device only as directed by the physician or healthcare provider.
- Use the device only for the intended use as described in this manual. Advice contained in this manual should not supersede instructions given by the physician.
- If you notice any unexplained changes in the performance of the device, if it is making unusual or harsh sounds, if the device or the power supply are dropped or mishandled, if water is spilled into the enclosure, or if the enclosure is broken, discontinue use and contact your ResMed Service Center.
- The device should only be used with masks (and connectors) recommended by ResMed or by a physician or respiratory therapist. A mask should not be used unless the device is turned on. Once the mask is fitted, ensure that the device is blowing air. The vent hole or holes associated with the mask should never be blocked.
  Explanation: The device is intended to be used with special masks (or connectors) which have vent holes to allow continuous flow of air out of the mask. When the device is turned on and functioning properly, new air from the device flushes the exhaled air out through the mask vent holes. However, when the device is not operating, insufficient fresh air will be provided through the mask, and the exhaled air may be rebreathed. Rebreathing of exhaled air for longer than several minutes can, in some circumstances, lead to suffocation. This applies to most models of CPAP or bilevel devices
- Only ResMed air tubing and accessories should be used with the device. A different type of air tubing or accessory may alter the pressure you actually receive, reducing the effectiveness of the treatment.
- Only use the ResMed 90W or 30W power supply unit. Use the 90W power supply unit to power the system comprising the device, H5i, air tubing, DC/DC converter and battery pack. The 30W power supply unit is designed to power the device only and recommended for traveling.
- To maintain electrical safety and in accordance with IEC 60601, where a personal computer is used with the flow generator, the personal computer must be at least 5′ (1.5 m) away from, or at least 8′ (2.5 m) above the patient. The Personal Computer must comply to IEC 60950.

⚠ CAUTIONS

- In the US, Federal law restricts the device to sale by or on order of a physician.
- Ensure that the device is protected against water. Enclose the device in the S9 travel bag for transport.

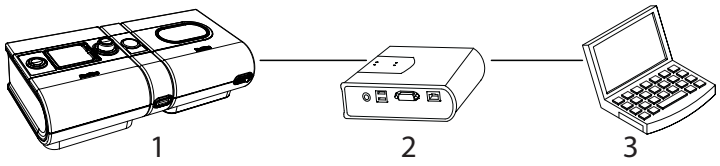
Note: The above are general warnings and cautions. Specific warnings, cautions and notes appear with the relevant instructions in the manual.

Welcome

The S9 VPAP Tx provides continuous positive airway pressure (CPAP) and bilevel therapy.

The S9 VPAP Tx is a component of the S9 VPAP Tx Lab System. The S9 VPAP Tx Lab System provides remote PC control of a positive airway pressure therapy device (therapy device) capable of delivering multiple therapy modes. The system comprises:

1. S9 VPAP Tx or other compatible ResMed therapy device
2. Tx Link connection module
3. EasyCare Tx titration software.



This guide provides instructions for the S9 VPAP Tx. Refer to the Tx Link Quick Setup Guide and EasyCare Tx Online Help for instructions on their use.

S9 VPAP Tx indications for use

The S9 VPAP Tx is indicated for the treatment and titration of patients with obstructive sleep apnea (OSA), respiratory insufficiency, central or mixed apneas, or periodic breathing. CPAP, S, ST, T and PAC modes are indicated for patients weighing more than 30 lb (13 kg); all other modes are indicated for patients weighing more than 66 lb (30 kg).

The S9 VPAP Tx is intended to be used in a clinical environment.

S9 VPAP Tx contraindications

Positive airway pressure therapy may be contraindicated in some patients with the following pre-existing conditions:

- severe bullous lung disease
- pneumothorax or pneumomediastinum
- pathologically low blood pressure, particularly if associated with intravascular volume depletion
- dehydration
- cerebrospinal fluid leak, recent cranial surgery or trauma.

S9 VPAP Tx adverse effects

Patients should report unusual chest pain, severe headache or increased breathlessness to the clinician. An acute upper respiratory tract infection may require temporary discontinuation of treatment. The following side-effects may arise during the course of therapy with the device:

- drying of the nose, mouth or throat
- nosebleed
- bloating
- ear or sinus discomfort
- eye irritation
- skin rashes.

S9 VPAP Tx at a glance

The S9 VPAP Tx system comprises the following elements:

- S9 VPAP Tx device
- H5i heated humidifier
- ClimateLine™ heated air tubing
- 90W power supply unit
- S9 travel bag
- S9 USB Adapter.

Optional components include:

- Standard air tubing
- SlimLine™ air tubing
- ClimateLine^{MAX} ™ heated air tubing
- 3 m air tubing
- Antibacterial filter.

Masks

Mask systems recommended for use with the S9 VPAP Tx can be found at www.resmed.com. For information on using a mask refer to the mask user guide.

For a complete list of recommended masks and their settings go to www.resmed.com on the **Products** page under **Service & Support**. If you do not have internet access, please contact your ResMed representative.

⚠ CAUTION

Non-vented masks should not be used with the device.

Supplemental oxygen

Supplemental oxygen can be used with the S9 VPAP Tx. For more information, see "Adding supplemental oxygen" on page 22.

Antibacterial filters

Antibacterial filters increase resistance in the air circuit and may affect accuracy of displayed and delivered pressure, particularly at high flows. ResMed has tested and recommends using an antibacterial filter with a low impedance (eg, 2 cm H_2O at 60 L/min).

Humidifier

The S9 VPAP Tx is compatible with the H5i heated humidifier. For further information on using this humidifier refer to the H5i user guide.

USB Adapter

The S9 USB Adapter is designed for use with the S9 VPAP Tx. The USB adapter connects the S9 VPAP Tx to a personal computer via Tx Link for remote monitoring and control. For further information on using this adapter refer to the S9 USB Adapter user guide.

Climate Control

The S9 VPAP Tx, when used in conjunction with the H5i and ClimateLine or ClimateLine^{MAX} heated air tubing, offers a feature called Climate Control.

Climate Control enables the automatic delivery of a constant value of absolute humidity to the patient's upper airway while protecting against rainout and allowing patients to select the air temperature that offers the most comfort for them.

Therapy modes

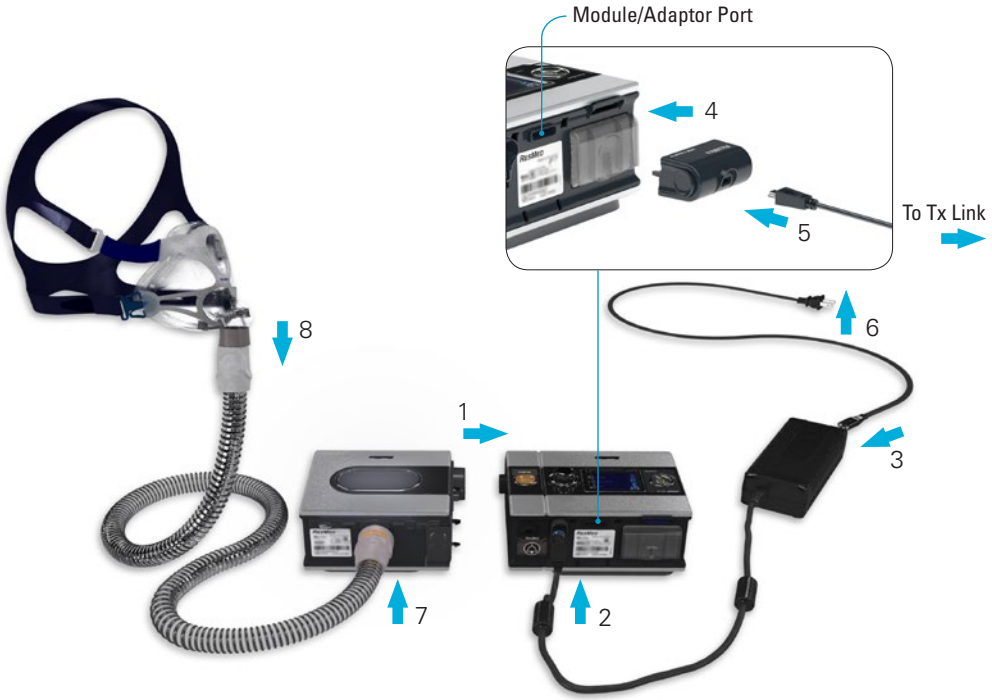
The following table describes the therapy modes available on the S9 VPAP Tx.

Therapy mode	Description
CPAP (Continuous Positive Airway Pressure)	Delivers a fixed pressure with optional Expiratory Pressure Relief (EPR). EPR can improve patient comfort.
AutoSet	Delivers CPAP therapy with optional Expiratory Pressure Relief (EPR). Automatically adjusts the CPAP pressure in response to snore, flow limited breaths and apneas.
VAuto	Automatically adjusts pressure in response to flow limitation, snore and apneas. Pressure Support (PS) is fixed throughout the night and can be set by the clinician. Min EPAP and Max IPAP restrict the delivered pressure range.
Bilevel	Provides for control over a number of related bilevel therapy modes—S, S/T and T. In all cases you may set two treatment pressures— one for inspiration (IPAP) and one for expiration (EPAP). The difference between IPAP and EPAP levels is the pressure support.
S (Spontaneous)	Senses when the patient is inhaling and exhaling and supplies the appropriate pressures accordingly. The difference between IPAP and EPAP levels helps determine the tidal volume.
S/T (Spontaneous/Timed)	Augments any breath initiated by the patient, but will also supply additional breaths should the patient breath rate fall below the clinician's set backup respiratory rate.
T (Timed)	The fixed respiratory rate and the fixed inspiration/expiration time set by the clinician is supplied regardless of patient effort.
PAC (Pressure Assist Control)	The inspiration time is preset in the PAC mode. There is no spontaneous/flow cycling. The inspiration can be triggered by the patient when respiratory rate is above a preset value, or time triggered breath will be delivered at the backup breath rate.
ASV (Adaptive Servo-ventilation)	Treats central sleep apnea and/or mixed apneas and periodic breathing. In ASV mode, the expiratory positive airway pressure (EPAP) is adjusted by the clinician to maintain upper airway patency, while Min PS and Max PS restricts the range of automatically adjusted pressure support.
ASVAuto (Automatic Adaptive Servo-ventilation)	Treats central sleep apnea and/or mixed apneas and periodic breathing. In ASVAuto mode, the expiratory airway pressure (EPAP) is automatically adjusted to maintain upper airway patency between the limits set by Min EPAP and Max EPAP, while Min PS and Max PS restrict the range of automatically adjusted pressure support.
iVAPS (intelligent Volume-Assured Pressure Support)	Maintains a preset target alveolar minute ventilation by monitoring delivered ventilation, adjusting the pressure support and providing an intelligent backup breath automatically.

S9 VPAP Tx basics

	Key	Function
	Start/Stop button	Starts or stops treatment. Power Save mode—hold for three seconds.
	Info menu button	Allows you to view the device service information or to exit from the menu.
	Setup menu button	Allows you to make changes to settings or to exit from the menu.
	Push dial	Turning the dial allows you to scroll through the menu and change settings. Pushing the dial allows you to enter into a menu and confirm your choice.
	Alarm mute button	Press once to mute alarms. Press a second time to un-mute. If the problem is still present, the alarm will sound again after two minutes.
	LCD screen	Displays the menus, treatment screens and reminders. Backlight—when treatment is being delivered, the backlight (including the Start/Stop button) automatically turns off after 30 seconds, otherwise it turns off after 3 minutes.
	Alarm LED	Yellow LED—flashes during an alarm.
	Therapy LED	Blue LED—always on during therapy (if enabled in the Options menu).

Setting up the S9 VPAP Tx



⚠ WARNING

- Make sure the power cord and plug are in good condition and the equipment is not damaged.
- Keep the power cord away from hot surfaces.
- Do not leave long lengths of air tubing around the top of the patient's bed. It could twist around the patient's head or neck while they are sleeping.
- Do not use electrically conductive or antistatic air tubings.
- Do not use the air tubing if there are any visible signs of damage.
- Only ResMed products are designed to be connected to the module connector port. Connecting other devices could damage the device.

⚠ CAUTION

- Incorrect system setup may result in incorrect mask pressure reading. Ensure the system is correctly set up.
- Be careful not to place the device where it can be bumped or where someone is likely to trip over the power cord.
- The H5i should only be connected or disconnected when the water tub is empty.
- Always place the H5i on a level surface below the level of the user to prevent the mask and tubing from filling with water.

The S9 VPAP Tx is compatible with the integrated H5i heated humidifier. For further information on using this humidifier refer to the H5i user guide.

1. Align the H5i with the S9 VPAP Tx and push them together until they click into place.
2. Connect the DC plug of the power supply unit to the rear of the S9 VPAP Tx.
3. Connect the power cord to the power supply unit.
4. Plug the USB Module into the Module/Adaptor port at the rear of the S9 VPAP Tx.

5. Connect the S9 VPAP Tx to the Tx Link via USB serial cable.
6. Plug the other end of the power cord into the power outlet.
7. Connect one end of the air tubing firmly onto the air outlet.
8. Connect the assembled mask system to the free end of air tubing.

The S9 VPAP Tx does not use the SD Card function to store data. All necessary data is transferred via Tx Link and available through the EasyCare Tx software.

Notes:

- *Always ensure that the S9 VPAP Tx is placed in an area where the alarm LED indicators are clearly visible.*
- *Place the power supply unit away from the H5i to allow for adequate ventilation.*

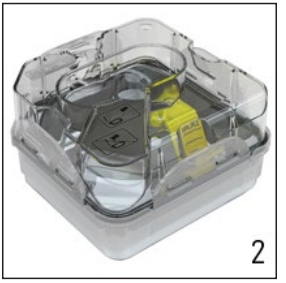
Filling the water tub

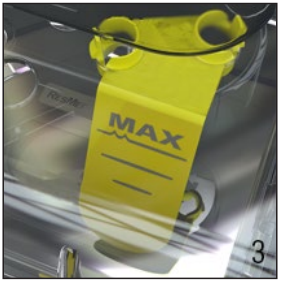
⚠ WARNING

Beware of electrocution. Do not immerse the device, humidifier, power supply or power cord in water. In the event of a spill, disconnect the device from the power supply and let the parts dry. Always unplug the device before cleaning and make sure that all parts are dry before plugging in the device.

⚠ CAUTION

- Do not overfill the water tub as water may enter the device and air tubing.
- Do not use any additives (eg, scented oils and perfumes). These may reduce the humidification output of the H5i and/or cause deterioration of the water tub materials.
- Take care when handling the H5i as the water/water tub may be hot. Allow 10 minutes for the heater plate and any excess water to cool.
- If liquids are inadvertently spilled into or on the H5i, unplug the device from the power outlet. Disconnect the H5i from the device and allow it to drain and dry before re-using.





1. Slide the latch and lift open the flip lid.
2. Remove the water tub.
3. Fill the water tub (through the center hole) with distilled or deionized water up to the maximum water level mark (12.5 fl oz / 380 mL).
4. Return the water tub to the H5i.
5. Close the flip lid ensuring that it clicks into place.

Mask and air tubing settings

Use the following settings below for each mask type:

Mask type	Settings
Full Face	Full Face
Pillows	Pillows
Nasal	Nasal (for Ultra Mirage mask, use 'Nasal Ultra')
Pediatric	Pediatric

Notes:

- *For more information on assembling the mask see the mask user guide.*
- *For a complete list of recommended masks and their settings go to www.resmed.com on the* **Products** *page under* **Service & Support**. *If you do not have internet access, please contact your ResMed representative.*

The S9 VPAP Tx is compatible with the following air tubing:

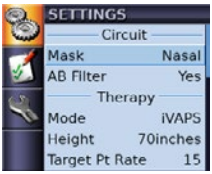
Air tubing	Specifications	Settings
ClimateLine	Heated Length: 6'6" (2 m) Inner diameter: 0.6" (15 mm)	Automatically detected
ClimateLine^{MAX}	Heated Length: 6'3" (1.9 m) Inner diameter: 0.75" (19 mm)	Automatically detected
SlimLine	Length: 6' (1.8 m) Inner diameter: 0.6" (15 mm)	If using the SlimLine, Standard or 3 m air tubing, adjust the tube setting via the Setup menu.
Standard	Length: 6'6" (2 m) Inner diameter: 0.75" (19 mm)	
3 m	Length: 9'10" (3 m) Inner diameter: 0.75" (19 mm)	

Notes:

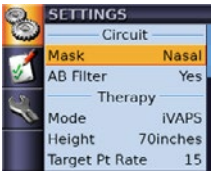
- *When using the SlimLine or ClimateLine above 20 cm H_2O, the device optimum performance may not be reached if used with an antibacterial filter. The device performance must be checked prior to using the SlimLine for use with an antibacterial filter.*
- *The ClimateLine/ClimateLine^{MAX} are designed only for use with the H5i.*

Navigating the menus

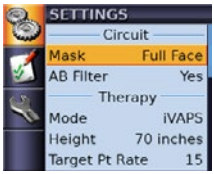
In general, to navigate the menus:



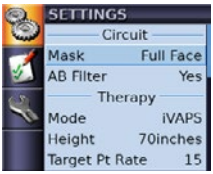
1. Turn until the parameter you require is displayed in blue.



2. Press . The selection is highlighted in orange.



3. Turn until you see the setting that you require.



4. Press to confirm your choice. The screen returns to blue.

About the menus

There are three menus that are designed to help you choose your options. These are:

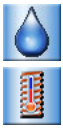
1. **Home** menu—for day to day adjustments.
2. **Setup** menu—where settings can be adjusted.
3. **Info** menu—provides service information.

Home menu

The Home menu shows you what features are currently activated, and the accessories that are connected to the device.

Humidity Level—displayed when the H5i is connected.

Climate Control—displayed when both the H5i and the ClimateLine or ClimateLine^{MAX} heated air tubing are connected and when Climate Control is set to Auto in the Setup menu.



Humidity Level and **Heated Tube**—displayed when both the H5i and the ClimateLine or ClimateLine^{MAX} heated air tubing are connected and when Climate Control is set to Manual in the Setup menu.

Changing settings via the Home menu

From the Home menu, you can adjust or check the following features:

Humidity level

Humidity levels can be adjusted at any time to find the setting that is most comfortable for the patient.

Climate Control

When the ClimateLine or ClimateLine^{MAX} heated air tubing is connected and Climate Control is enabled, the air temperature can be adjusted to find the setting that is most comfortable for the patient.

When set to Auto, Climate Control prevents rainout by maintaining 80% relative humidity in the delivered air. If Climate Control is set to Manual, Humidity Level and Heated Tube temperature can be set independently.

Mask Fit

Mask Fit is designed to help fit the mask properly to the patient.

The Mask Fit feature delivers CPAP pressure for a three-minute period, prior to starting treatment. During this time, the mask can be adjusted to minimise leaks.

To use Mask Fit:

1. Fit the mask as described in the mask user guide.
2. Press  for at least three seconds.
   One of the MASK FIT screens is displayed (as shown on the left).
3. If necessary, adjust the mask, mask cushion and headgear until there is a secure and comfortable fit. After three minutes, the pressure reverts to the set pressure and treatment will begin. You can end Mask Fit at any time by pressing  .

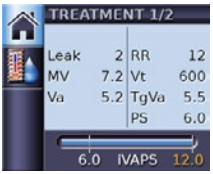
Viewing the treatment screens

Depending on how the system has been configured and what mode has been selected, you will see one of the following example screens (shown in iVAPS mode below) when the device is running:

- ✓ H5i humidifier

- ✓ H5i humidifier
- ✓ ClimateLine/ClimateLine^{MAX}
- ✓ Climate Control – Auto

- ✓ H5i humidifier
- ✓ ClimateLine/ClimateLine^{MAX}
- ✓ Climate Control – Manual



- ✓ Therapy data

To toggle between the treatment screens, press  from your HOME screen.

- ✓ Treatment with device trigger (Timed) and cycle (Timed, Ti Max or Ti Min) breath indicators

- ✓ Treatment with spontaneous trigger and cycled breaths

Pressure bar: In bilevel modes, the pressure bar is marked with fixed vertical lines indicating the expiratory and inspiratory pressures. In CPAP and AutoSet modes, only a set pressure is shown.

Treatment screen parameters

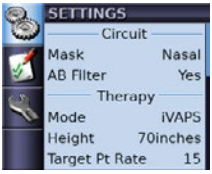
Parameter	Modes										Description
	CPAP	AutoSet	VAuto	S	ST	T	PAC	iVAPS	ASV	ASVAuto	
Leak	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Estimate of the total rate of air escaping due to mouth and unintentional mask leaks, expressed in L/min (5-breath moving average).
Minute Ventilation (MV)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Volume of air breathed in, or out within any 60-second period, expressed in L/min (5-breath moving average).
Target Minute Ventilation (TgMv)									✓	✓	Minute ventilation the device is attempting to achieve. Pressure support increases if the minute ventilation falls below the target,and decreases if it goes above the target.
Respiratory rate (RR)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Frequency of breathing, expressed as the number of breaths per minute (5-breath moving average).
Tidal volume (Vt)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Volume of air inspired or expired in one respiratory cycle (breath), expressed in mL (5-breath moving average).
Pressure support (PS)			✓	✓	✓	✓	✓	✓	✓	✓	Difference between IPAP and EPAP.
Alveolar minute ventilation (Va)								✓			Minute volume without dead space, expressed in L/min.
Target alveloar ventilation (TgVa)								✓			Target alveolar minute ventilation that determines the amount of pressure support required, expressed in L/min.
Ti			✓	✓	✓	✓	✓	✓	✓	✓	Duration of inspiration (ie, the respiratory flow into the lungs), expressed in seconds (5-breath moving average).
I:E	✓	✓	✓	✓	✓	✓	✓	✓			Inspiration to expiration ratio measured by the device (5-breath moving average).
Ti Max			✓	✓	✓			✓			Maximum inspiration time in seconds
Ti Min			✓	✓	✓			✓			Minimum inspiration time in seconds.
% Spontaneous Triggering or Cycling (%Spont Trig or %Spont Cyc)			✓	✓	✓		✓	✓			Percentage of breaths that are spontaneously triggered or cycled (average of the last 20 breaths). In PAC mode, there is no spontaneous cycling.
Trigger/Cycle indicators (Timed, Ti Max or Ti Min)			✓	✓	✓	✓	✓	✓			Indicates a patient or device triggered/cycled breath. In ST mode, Timed indicator is left blank if it is a spontaneous breath.

Setup menu

The Setup menu allows set up of all parameters pertaining to the patient's therapy.

Setup menu access

To access Setup menu, press the Setup button. There are three screens available from the Setup menu as shown in iVAPS mode below:



Settings

Displays parameters directly affecting the patient's therapy.

Options

Displays parameters affecting the patient's comfort.

Configuration

Displays general device setting and resetting options.

Clinical setup menu parameters*

Parameter	Modes										Range	Description
	CPAP	AutoSet	VAuto	S	ST	T	PAC	iVAPS	ASV	ASVAuto		
Settings												
Circuit												
Mask type	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Full Face / Nasal / Pillows / Nasal Ultra / Pediatric **Default:** Full Face	Selects the type of mask used by the patient.
Tube type	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SlimLine / Standard / 3 m **Default:** Standard	Shows the type of air tubing used by the patient. Not displayed if ClimateLine or ClimateLine^{MAX} is connected
AB filter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	No / Yes **Default:** No	Enables or disables antibacterial filter. Not displayed if H5i is connected.
Ext. humidifier	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	No / Yes **Default:** No	Enables or disables an external humidifier.
Therapy												
Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	CPAP / S / ST / T / PAC / iVAPS / ASVAuto / ASV / AustoSet / VAuto **Default:** CPAP	Sets the therapy mode available on the device.
Set pressure	✓										4–20 cm H_2O **Default:** 4 cm H_2O	Sets the fixed treatment pressure.
EPR Level	✓	✓									Off / 1 / 2 / 3 **Default:** 3	Sets the EPR value.
Height								✓			44-100 inches (110–250 cm) **Default:** 70 inches (175 cm)	Body height needed for the dead space determination.
Target Pt Rate								✓			8–30 BPM **Default:** 15 BPM	The rate input to the iVAPS algorithm. This should be set at the patient's actual respiratory rate.
Target Va								✓			1–30 L/min **Default:** 5.2 L/min	Used to determine the amount of pressure support required by the iVAPS algorithm.
IPAP				✓	✓	✓	✓				4–30 cm H_2O **Default:** 10 cm H_2O	Sets the pressure which will be delivered to the patient when the device is triggered into inspiration.

*Default settings may differ from country to country

Parameter	Modes										Range	Description
	CPAP	AutoSet	VAuto	S	ST	T	PAC	iVAPS	ASV	ASVAuto		
EPAP				✓	✓	✓	✓	✓	✓		3–25 cm H_2O** **Default:** 4 cm H_2O	Sets the pressure which will be delivered to the patient when the device is cycled into expiration. Dependent on IPAP.
Min PS								✓	✓	✓	0–20 cm H_2O **Default:** 4 cm H_2O	Minimum pressure support in iVAPS mode. Dependent on EPAP.
Max PS								✓	✓	✓	0–28 cm H_2O **Default:** 20 cm H_2O	Maximum pressure support in iVAPS mode. Dependent on EPAP and Min PS.
Respiratory Rate					✓	✓	✓				5–50 BPM **Default:** 10 BPM	Sets the breaths per minute (BPM) or 'backup' rate.
Ti Max			✓	✓	✓			✓			0.3–4.0 sec **Default:** 2 sec	Sets the maximum limit on the time the device spends in IPAP. Dependent on Respiratory Rate.
Ti Min			✓	✓	✓			✓			0.1–4.0 sec **Default:** 0.3 sec	Sets the minimum limit on the time the device spends in IPAP. Dependent on Ti Max.
Ti						✓	✓				0.1–4.0 sec **Default:** 2 sec	Sets the duration of inspiration in timed breath. Dependent on Respiratory Rate.
Rise Time				✓	✓	✓	✓	✓			Min / 100–900 ms **Default:** 150 ms	Sets the time taken for the device to reach to IPAP. Dependent on Ti Max and Ti.
Trigger			✓	✓	✓		✓	✓			Very Low / Low / Med / High / Very High **Default:** Med	Sets the level of inspiratory flow above which the device changes from EPAP to IPAP.
Cycle			✓	✓	✓			✓			Very Low / Low / Med / High / Very High **Default:** Med	Sets the level of inspiratory flow below which the device changes from IPAP to EPAP.
Max IPAP			✓								4–25 cm H_2O **Default:** 25 cm H_2O	Sets the maximum inspiratory pressure delivered by the device.
Min EPAP			✓								4–[Max IPAP] cm H_2O **Default:** 4 cm H_2O	Sets the minimum expiratory pressure delivered by the device.
Pressure Support			✓								0–10 cm H_2O **Default:** 4 cm H_2O	Difference between IPAP and EPAP. Adjust for patient comfort.

** 2-25 cm H_2O for Europe and APAC

Parameter	Modes										Range	Description
	CPAP	AutoSet	VAuto	S	ST	T	PAC	iVAPS	ASV	ASVAuto		
Easy-Breathe (US Only)				✓							On / Off **Default:** On	Enables Easy-Breathe comfort feature.
Max Pressure		✓									Min–20 cm H_2O, 0.2 cm H_2O increments **Default:** 20 cm H_2O	Sets the upper limit of treatment pressure.
Min Pressure		✓									4–Max cm H_2O, 0.2 cm H_2O increments **Default:** 4 cm H2O	Sets the lower limit of treatment pressure.
Min EPAP										✓	4–15 cm H_2O **Default:** 4 cm H2O	Sets the minimum EPAP delivered by the device.
Max EPAP										✓	4–15 cm H_2O **Default:** 15 cm H2O	Sets the maximum EPAP delivered by the device. Dependent on Min EPAP.
Options												
Climate Control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Auto / Manual **Default:** Auto	Sets the type of Climate Control.
Therapy LED	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	On / Off **Default:** Off	Enables or disables the blue LED.
Date	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	DD Mmm YYYY	Sets the current date or time. If you set a new date or time that occurs in the past then an 'Invalid date/time, data exists for this period' message is displayed.
Time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	00:00 (24 hr)	
Configuration												
Language	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	English / Français / Deutsch / Español / Português **Default:** English	Sets the display language.
Restore factory defaults	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Yes / No	Resets machine default settings (except for language, date and time).
Pressure units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	cm H_2O / hPa **Default:** cm H_2O	Sets pressure unit.
Temperature units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	°F / °C **Default:** °F	Sets temperature unit.
Height units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	cm / inches **Default:** inches	Sets height unit.

Info menu

Service

Displays the device run hours, software version and other component versions.

Parameter	Description
Run hours	Displays the total number of hours the device has been used including warm-up and cool-down times for the humidifier.
SW	Displays the current software version.
BID	Displays the boot loader ID.
VID	Displays the variant ID.
AID	Displays the alarm software ID
HID	Displays the humidifier software ID.

Managing Climate Control

Designed to be ideal for most patients, Climate Control Auto enables the automatic delivery of a constant value of absolute humidity while protecting against rainout.

To allow for increased flexibility, Climate Control can be turned to Manual in the Setup menu. Setting Climate Control to Manual disables the automatic control of humidity and allows humidity and temperature levels to be set independently. However, rainout protection is not provided when Climate Control is set to Manual.

Mode	Humidity		Temperature	
	Setting range	Default settings	Setting range	Default settings
Climate Control – Auto 	**Climate Control**			
	Constant absolute humidity (depending on temperature setting)	–	Off*, 60°F–86°F (16°C–30°C)	80°F (27°C)
Climate Control – Manual 	**Humidity level**		**Heated tube**	
	Off–6.0 (0.5 increments)	3	Off, 60°F–86°F (16°C–30°C)	80°F (27°C)

* When the temperature setting is set to Off the tube will not heat the air, nor will the humidifier heat the water to add humidity to the air.

Delivering therapy

⚠ WARNING

Blocking the air tubing and/or air inlet of the device while in operation could lead to overheating of the device.

⚠ CAUTION

Make sure the area around the device is dry and clean and clear of bedding, clothes or other objects that could block the air inlet or cover the power supply unit.

The following procedure describes the steps required to start therapy at the patient's bedside using the S9 VPAP Tx. Once these steps are completed, S9 VPAP Tx can be remotely controlled from the EasyCare Tx software application on the PC.

1. Make sure power is connected.
2. Check the mask type is correct (see "Mask and air tubing settings" on page 10).
3. Fit the mask to patient, and adjust the mask and headgear to achieve optimal fit.
4. Perform mask fit (see "Mask Fit" on page 12).

Once therapy has started a treatment screen is displayed.

In order to assist the heater plate in cooling, the device will continue to blow air for up to an hour after treatment has stopped. However, you can unplug the device from the power outlet at any time and allow the heater plate to cool without air flow, or press ⏻ to enable Power Save mode.

Note: *If power is interrupted during treatment, the device automatically restarts therapy when power is restored.*

Adding supplemental oxygen

⚠ WARNING

- Explosion hazard—do not use in the vicinity of flammable anesthetics.
- Oxygen supports combustion. Oxygen must not be used while smoking or in the presence of an open flame.
- Always ensure that the device is turned on and airflow generated before the oxygen supply is turned on. Always turn the oxygen supply off before the device is turned off, so that unused oxygen does not accumulate within the device enclosure and create a risk of fire.

The S9 VPAP Tx is designed to be compatible with the following levels of supplemental oxygen:

- up to 15 L/min for CPAP, S, T, ST, ASV and PAC modes
- up to 4 L/min for AutoSet, VAuto, iVAPS and ASVAuto modes.

At a fixed rate of supplemental oxygen flow, the inhaled oxygen concentration will vary depending on:

- where the oxygen is introduced;
- the pressure settings;
- patient breathing pattern;
- mask selection; and
- leak rate.

Adding oxygen may affect the trigger and cycle reliability, delivered pressure, and the accuracy of the displayed leak, tidal volume, minute ventilation and alveolar ventilation.

To add supplemental oxygen:

1. Fit the ResMed Oxygen Connector Port to the air outlet of the S9 VPAP Tx and fit the air tubing to the oxygen connector.
2. Fit the oxygen supply tubing to the port on the oxygen connector.
3. Attach the other end of the oxygen supply tubing to an oxygen flowmeter.
4. Optimize the therapy device settings first, and then add oxygen if baseline saturation remains low.
5. Titrate oxygen according to institutional guidelines.
6. Determine an initial oxygen flow rate during wakefulness. Only increase oxygen during sleep when titration of pressure is complete.

Cleaning and maintenance

Regular cleaning should be carried out on the S9 VPAP Tx.

Clean the exterior of the device with a damp cloth and mild detergent.

Reprocessing the H5i and air tubing between patients

The H5i and air tubing should be reprocessed when used between patients. Cleaning and disinfection instructions are available from the ResMed website, www.resmed.com under **Products** and **Service & Support**. If you do not have internet access, please contact your ResMed representative.

Replacing the air filter

Inspect the air filter for holes and check whether it is blocked by dirt or dust. With normal use of the S9 VPAP Tx, the air filter needs to be replaced every six months (or more often in a dusty environment).

1. Remove the air filter cover from the back of the device.
2. Remove and discard the old filter.
3. Insert a new ResMed air filter ensuring that it is sitting flat in the air filter cover.
4. Replace the air filter cover.

Notes:

- *Ensure the air filter and air filter cover are fitted at all times.*
- *Do not wash the air filter. The air filter is not washable or reusable.*

The following filters are available for use with the S9 VPAP Tx:

Filter	Efficiency
Standard (ASMB 160)	88% at 7 micron
Hypo-allergenic (Air Safety Electret100 – electrostatic filter)	89.8% at 0.5 micron, bacterial efficiency of 99.54%.

Working with alarms

The S9 VPAP Tx is fitted with an alarm module that continuously monitors both therapy and device conditions. Alarms are only activated when therapy is running. An alarm condition can be indicated by an audible sound, a flashing yellow LED or a message on the screen.

Note: *The alarms should be tested after final system setup to ensure the alarms work as required.*

Alarms menu

The alarms pre-set for the device are:

- Power fail
- Blocked tube*
- System fault (system error).

* Blocked tube alarm is only triggered reliably for pressures above 10 cm H_2O.

If the system has not been properly assembled, the device will trigger an alarm. Check that the air tubing has been properly attached to the device, mask and humidifier.

Clearing the alarm message

When an alarm activates, a corresponding alarm message is displayed. To clear an alarm message, press . This allows you to return to the previously displayed screen.

Note: *Alarms are cleared by pressing* .

Testing the alarms

When the device is turned on, the alarm LED will flash and the alarm will sound to confirm that the alarm is working.

To test the alarm manually or to adjust the alarm volume using the menus, go to the Settings menu and select Alarm Vol/Test. When the setting is selected and confirmed, the alarm will sound and all LEDs will be active.

The alarms should be tested weekly. To test some of the alarm conditions, follow the procedures described below. When completed, stop therapy and return all settings to their original settings appropriate to the patient before delivering therapy.

Power fail
1. Set up the device with the air tubing attached, but no mask.
2. Press the Start/Stop key to start therapy.
3. Unplug the DC plug of the power supply unit from the rear of the device. The alarm activates immediately.
4. Plug the DC plug back in. The alarm stops.
Blocked tube
1. Set up the device with the air tubing attached, but no mask.
2. Set pressure above 12 cm H_2O in CPAP mode. *Note: Blocked Tube alarm only activates above 10 cm H_2O.*
3. Press the Start/Stop key to start therapy.
4. Block the air tubing with your hand. The alarm activates when tubing is blocked for 30–50 seconds.
5. Unblock the air tubing. The alarm stops.
System Fault
No testing for system fault.

Troubleshooting

If there is a problem, try the following suggestions. If the problem cannot be solved, contact your equipment supplier or ResMed. Do not attempt to open the device.

Problem/Possible cause	Solution
No display	
Power is not connected.	Ensure the power cord is connected and the power outlet (if available) is on.
The DC plug is partially inserted into the back of the device or inserted too slowly.	Fully insert the DC plug.
The S9 VPAP Tx and H5i are not connected correctly.	Ensure that the S9 VPAP Tx and H5i are securely attached.
Insufficient air delivered from the device	
Air filter is dirty.	Replace air filter.
Air tubing is not connected properly.	Check air tubing.
Air tubing is blocked, pinched or punctured.	Unblock or free the air tubing. Check the air tubing for punctures.
Mask and headgear are not positioned correctly.	Adjust position of mask and headgear.
Incorrect air tubing selected.	If you are using the SlimLine, Standard or 3 m air tubing ensure that you have the correct air tubing selected via the menu.
The H5i flip lid is not latched correctly.	Close the flip lid ensuring that it clicks into place.
The H5i flip lid seal is not fitted correctly.	Make sure the flip lid seal is facing the right way up and fitted securely.
Mask vents might be blocked.	Check if you have sufficient venting. Unblock mask vents if necessary.
EPAP may be set too low.	Adjust EPAP settings.
There is excessive leak.	Adjust position of mask and headgear.
Pressure rises inappropriately	
Talking, coughing or breathing in an unusual manner.	Avoid talking with a nasal mask on, and breathe as normally as possible.
Mask cushion is buzzing against the skin.	Adjust the headgear.
Cushion seated incorrectly causing excessive leak.	Adjust headgear or re-fit cushion.
Displays message: Heated tube fault, replace tube	
Device has been left in a hot environment.	Allow to cool before re-use. Disconnect the power cord and then reconnect it to restart the device.
There is a fault in your ClimateLine or ClimateLine^{MAX} heated air tubing.	Discontinue using your ClimateLine or ClimateLine^{MAX} heated air tubing and contact your service provider. Use SlimLine, Standard or 3 m air tubing in the interim.
Displays message: High temperature fault, refer to user manual	
Device has been left in a hot environment.	Allow to cool before re-use. Disconnect the power cord and then reconnect it to restart the device.

Problem/Possible cause	Solution
Air filter is blocked.	Replace your air filter. Disconnect the power cord and then reconnect it to restart the device.
Air tubing is blocked.	Check your air tubing and remove any blockages. Disconnect the power cord and then reconnect it to restart the device.
Humidity level setting is too high, resulting in accumulation of water in the air tubing.	Turn the humidity level setting down and empty the water from the air tubing.
Displays message: Check ResMed 30/90W Power Supply Unit and fully insert the connector	
The DC plug is partially inserted into the back of the device or inserted too slowly.	Fully insert the DC plug.
A non-ResMed power supply unit is connected to the device.	Remove the power supply unit and replace with a ResMed power supply unit.
The power supply unit is being covered by bedding.	Make sure that the power supply unit is free from bedding, clothes or other objects that could cover it.
Water splashing on your face from the H5i	
The water tub is overfilled.	Check that the water level is below the maximum water level mark.
Condensation is forming in the air tubing and mask.	Turn the humidity level setting down via the menu.
Leaking water tub	
The water tub may be damaged or cracked.	Contact your service provider for a replacement.
The cleanable water tub is not assembled correctly.	Check for damage and reassemble the cleanable water tub correctly.
Air feels too warm/cold in the mask	
The temperature of the ClimateLine or ClimateLine^{MAX} heated air tubing is set too high/low.	Turn up/down the heated air tubing temperature via the menu.
Alarm is activated and the LCD screen display disappears	
Power failure.	Remove the patient's mask until power is restored.
Power cord is disconnected or mains power switch is turned off during therapy.	Ensure the power cord is connected and the mains power outlet (if available) is on.
Displays message: Tube blocked, please check your tube	
Air tubing is blocked.	Check the air tubing and remove any blockages. Disconnect the power cord and then reconnect it to restart the device.
Displays message: Alarm module fault, please contact service provider	
General failure of the device and/or the alarm module. Therapy cannot be started again.	Contact your service provider immediately.

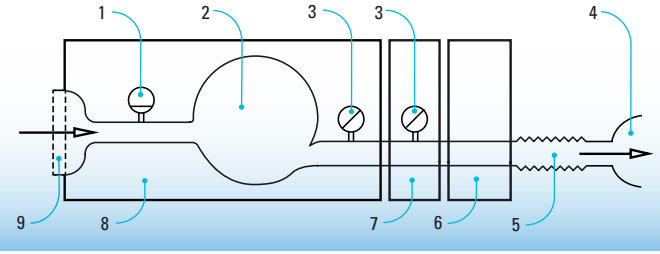
Technical specifications

General technical specifications	
Power supply	90W power supply unit Input range: 100–240V; 50–60Hz; 115V, 400Hz nominal for aircraft use Typical power consumption: 70W (80VA) Maximum power consumption: 110W (120VA)
	90W DC/DC converter Nominal inputs: 12V, 24V Typical power consumption: 70W Maximum power consumption: 110W
Environmental conditions	**Operating temperature:** +41°F to +95°F (+5°C to +35°C) ***Note:*** *The air flow for breathing produced by this therapy device can be higher than the temperature of the room. Under extreme ambient temperature conditions (104°F/40°C) the device remains safe.* **Operating humidity:**10 to 95% non-condensing **Operating altitude:** Sea level to 8,500' (2,591 m); air pressure range 1013 hPa to 738 hPa **Storage and transport temperature:** -4°F to +140°F (-20°C to +60°C) **Storage and transport humidity:** 10 to 95% non-condensing
Electromagnetic compatibility	Product complies with all applicable electromagnetic compatibility requirements (EMC) according to IEC60601-1-2, for residential, commercial, and light industry environments. It is recommended that mobile communication devices are kept at least one meter away from the device. Information regarding the electromagnetic emissions and immunity of these ResMed devices can be found on www.resmed.com, on the Products page under Service and Support. Click on the PDF file for your language.
Aircraft use	ResMed confirms that the S9 VPAP Tx meets the Federal Aviation Administration (FAA) requirements (RTCA/DO-160, section 21, category M) for all phases of air travel.
IEC 60601-1 classification	Class II (double insulation), Type BF, Ingress Protection IP21
Measuring and display devices	**Pressure sensor:** Internally located at device outlet, analog gauge pressure type, -5 to +45 cm H_2O **Flow sensor:** Internally located at device inlet, digital mass flow type, -70 to +200 L/min

S9 VPAP Tx technical specifications	
Mode pressure ranges	CPAP, AutoSet mode Pressure: 4–20 cm H_2O; S, ST, T and PAC mode IPAP: 4–30 cm H_2O; EPAP: 2–25 cm H_2O; iVAPS mode PS: 0–27 cm H_2O; EPAP: 2–25 cm H_2O; VAuto mode PS: 0-10 cm H_2O; Min EPAP: 4 cm H_2O; Max IPAP: 25 cm H_2O; ASV and ASVAuto mode PS: 0–20 cm H_2O; EPAP: 4–15 cm H_2O;
Maximum single fault pressure	**Maximum single fault steady state pressure:** 30 cm H_2O—if pressure exceeded for > 6 sec; 40 cm H_2O—if pressure exceeded for >1 sec

Sound: DECLARED DUAL-NUMBER NOISE EMISSION VALUES in accordance with ISO 4871:1996	**Sound pressure level (CPAP mode)**	
	with SlimLine air tubing:	26 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007
	with Standard air tubing:	27 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007
	with either SlimLine or Standard air tubing and H5i:	28 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007
	Sound power level (CPAP mode)	
	with SlimLine air tubing:	34 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007
	with Standard air tubing:	35 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007
	with either SlimLine or Standard air tubing and H5i:	36 dBA with uncertainty of 2 dBA as measured according to ISO 17510-1:2007
Alarm volume settings	Low (nominal 56 dBA), Medium (nominal 68 dBA), High (nominal 80 dBA)	
Physical	**Dimensions (L x W x H):** 6.0" x 6.8" x 3.4" (153 mm x 172 mm x 86 mm) **Weight:** 2.30 lbs (1.045 kg) **Housing construction:** Flame retardant engineering thermoplastic **Air outlet:** 22 mm conical air outlet (complies with ISO 5356-1:2004)	
Air filter	**Standard:** Polyester non-woven fiber **Hypoallergenic:** Acrylic and polypropylene fibers in a polypropylene carrier	
Supplemental oxygen	Recommended maximum supplemental oxygen: 15 L/min (CPAP, S, T, ST, ASV and PAC modes), 4 L/min (AutoSet, VAuto, iVAPS and ASVAuto modes)	

Pneumatic flow path



1. Flow sensor
2. Blower
3. Pressure sensor
4. Mask
5. Air tubing
6. H5i
7. Alarm module
8. Device
9. Inlet filter

Flow (maximum) at set pressures

The following are measured at the end of the specified air tubing:

Pressure cm H_2O	S9 VPAP Tx and standard air tubing, L/min	S9 VPAP Tx, H5i and standard air tubing, L/min	S9 VPAP Tx and SlimLine, L/min	S9 VPAP Tx, H5i and ClimateLine, L/min
4	200	170	195	170
8	200	170	190	170
12	200	170	184	170
16	200	170	175	170
20	190	170	168	161
25	180	161	144	125

Displayed values

Value	Range	Display resolution
Pressure sensor at air outlet		
Mask pressure	3–30 cm H_2O	0.1 cm H_2O
Flow derived values		
Leak	0–200 L/min	1 L/min
Tidal volume	0–4000 mL	1 mL
Respiratory rate	0–50 BPM	1 BPM
Minute ventilation	0–30 L/min	0.1 L/min
Ti	0.1–4.0 sec	0.1 sec
I:E ratio	1:50–2:1	0.1
Value	**Accuracy[1]**	
Pressure measurement[1]		
Mask pressure	±0.5 cm H_2O (+ 4% of measured value)	
Flow measurements[1]		
Leak[2]	±12 L/min or 20% of reading, whichever is greater, at 0 to 60 L/min	
Tidal volume[2]	±20%	
Respiratory rate[2]	±1.0 BPM	
Minute ventilation[2]	±20%	

[1] Results are expressed at ATPD (Ambient Temperature and Pressure, Dry)

[2] Accuracy may be reduced by the presence of leaks, supplemental oxygen, tidal volumes <100 mL or minute ventilation <3 L/min.

Symbols

The following symbols may appear on your product or packaging.

⚠ Caution; Read instructions before use; **IP21** Protection against insertion of fingers and against vertically dripping water; Type BF equipment; Class II equipment; Start/Stop; Manufacturer; EC REP European Authorised Representative; RoHS European RoHS; LOT Batch code; REF Catalogue number; SN Serial number; ⎓ Direct current; China pollution control logo 1; China pollution control logo 2; **IP20** Not drip proof; Keep dry; **Rx** Only Prescription only (In the US, Federal law restricts these devices to sale by or on the order of a physician.).

Environmental information

WEEE 2002/96/EC is a European Directive that requires the proper disposal of electrical and electronic equipment. This device should be disposed of separately, not as unsorted municipal waste. To dispose of your device, you should use appropriate collection, reuse and recycling systems available in your region. The use of these collection, reuse and recycling systems is designed to reduce pressure on natural resources and prevent hazardous substances from damaging the environment.

If you need information on these disposal systems, please contact your local waste administration. The crossed-bin symbol invites you to use these disposal systems. If you require information on collection and disposal of your ResMed device please contact your ResMed office, local distributor or go to www.resmed.com/environment

Servicing

The S9 VPAP Tx is intended to provide safe and reliable operation when operated in accordance with the instructions provided by ResMed. ResMed recommends that the S9 VPAP Tx be inspected and serviced by an authorized ResMed Service Center if there is any sign of wear or concern with device function. Otherwise, service and inspection of the devices generally should not be required during the five year design life of the device.

Limited warranty

ResMed Ltd (hereafter 'ResMed') warrants that your ResMed product shall be free from defects in material and workmanship from the date of purchase for the period specified below.

Product	Warranty period
Mask systems (including mask frame, cushion, headgear and tubing)—excluding single-use devices	90 days
Accessories—excluding single-use devices	
Humidifier water tubs	
Batteries for use in ResMed internal and external battery systems	6 months
CPAP and bilevel device data modules	1 year
Humidifiers and humidifier cleanable water tubs	
Titration control devices	
CPAP, bilevel and ventilation devices (including external power supply units)	2 years
Battery accessories	
Portable diagnostic/screening devices	

This warranty is only available to the initial consumer. It is not transferable.

If the product fails under conditions of normal use, ResMed will repair or replace, at its option, the defective product or any of its components.

This Limited Warranty does not cover: a) any damage caused as a result of improper use, abuse, modification or alteration of the product; b) repairs carried out by any service organization that has not been expressly authorized by ResMed to perform such repairs; and c) any damage or contamination due to cigarette, pipe, cigar or other smoke; and d) any damage cause by water being spilled on or into an electronic device.

Warranty is void on product sold, or resold, outside the region of original purchase.

Warranty claims on defective product must be made by the initial consumer at the point of purchase.

This warranty replaces all other expressed or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose. Some regions or states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

ResMed shall not be responsible for any incidental or consequential damages claimed to have resulted from the sale, installation or use of any ResMed product. Some regions or states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from region to region. For further information on your warranty rights, contact your local ResMed dealer or ResMed office.


S9™ Series
More. Comfort.

258189/2 2013-02
S9 VPAP Tx
CLINICAL
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Manufacturer: ResMed Ltd 1 Elizabeth Macarthur Drive Bella Vista NSW 2153 Australia. **Distributed by:** ResMed Corp 9001 Spectrum Center Boulevard San Diego CA 92123 USA. EC REP ResMed (UK) Ltd 96 Milton Park Abingdon Oxfordshire OX14 4RY UK. See www.resmed.com for other ResMed locations worldwide.